REMARKS

Claims 1-44 remain in the application. The reaction of iso-cyanates and polyols is separated from the reaction of epoxy-terminated oligomers and polyols (1) by amending Claims 1, 8, and 16 to recite only iso-cyanates and polyols and amending the dependent claims (Claims 6-7, 13-14, and 21-22) as appropriate to be consistent therewith and (2) by adding new Claims 23-44 that recite only epoxy-terminated oligomers and polyols. Claims 23-44 are analogous to Claims 1-22, but for the different reactants. Since polyvinyl alcohols are a sub-set of polyols, the claim language is amended to recite polyols only. Claim 7 ("stoichiometric") is amended to be consistent.

Since the Examiner has cited no art as to the reaction of epoxy-terminated oligomers and polyols, then Claims 23-44 are considered to be patentable over the art already applied by the Examiner, and will not be discussed further.

Claims 1 and 5-7 are rejected under 35 USC 103(a) as being unpatentable over Shoji et al (U.S. Patent 6,087,051) in view of Yacobucci et al (U.S. Patent 6,312,858) and Thompson et al (U.S. Patent 6,341,856).

Shoji et al disclose an information recording material having thereon an image carrier layer composed of a hydrophilic polymer and a protective covering layer. The protective covering layer contains an aqueous dispersion of preformed polyurethane or an aqueous dispersion of polyacryl resin. This cover layer is then formed by evaporating of water. It is agreed with the Examiner that Shoji et al disclose depositing the polyurethane on the substrate, in what might be termed a "one-component" or "one-part" process.

Yacobucci et al '858 disclose a protective polycarbonate-polyurethane overcoat for image recording elements. The protective overcoat comprises an aqueous dispersion of preformed polycarbonate-containing polyurethane polymer having a T_g of 0° to 70°C and a molecular weight of 15,000 to 300,000, wherein the amount of polycarbonate, based on the total weight of the polymer, is at least 20 percent.

Thompson et al disclose an ink jet printing process using reactive inks. The ink contains dyes or pigments or other colorants, a liquid carrier, and compounds with functional groups capable of reacting with active hydrogen, and compounds with functional groups containing active hydrogen, or functional groups capable of conversion to active hydrogen containing groups. One or more emulsifying agents emulsify the liquid

ink. An image is printed onto a substrate, at a relatively low temperature, so that the ink is not activated during the process of printing onto the medium. The image is subsequently transferred or permanently fixed on the substrate by the application of heat and pressure, which activates the printed ink, and bonds the colorant to the substrate. The blocking groups are removed by the application of heat or other energy during activation of the printed ink on media.

Applicants' Claims 1 and 5-7 are directed to a fixative for ink-jet printing for overcoating at least one ink printed on a print medium. The fixative comprises a two-part system and consists essentially of (1) at least one reactive monomer or oligomer comprising at least one iso-cyanate and (2) at least one second component comprising at least one polyol plus at least one base catalyst.

The Examiner argues that Shoji et al teach Applicants' invention, but for the requirement in the claims of (a) a two-part system, (b) glass transition temperature and melting temperature of the polyurethane, and (c) the amount of reactive monomer.

The Examiner contends that it is well known that polyurethane is formed by the reaction of isocyanate and polyol. This is true. However, Shoji et al disclose utilizing an ink jet head as one preferred means of forming the polyurethane cover layer on the print medium from an aqueous polymer dispersion. Applicants found that there are several problems with forming the polyurethane on the print medium in a one-part system, problems that are solved with employing their claimed two-part system; see, e.g., paragraphs 0031-0039 of Applicants' specification.

The Examiner contends that there is no evidence to indicate any criticality of the two-part system over the one-part system. To the contrary, Table IV and the text associated therewith (paragraphs 0054-0074) show the improved results of the two-part system compared with the one-part system, such as faster film formation (paragraph 0071), formation of a ***hydrophobic*** polymer (paragraph 0072), and three-dimensional structure for providing improved resistance to mechanical abrasion and water penetration and superior permanent image attributes, compared with the preformed polymer (paragraph 0074), which, Shoji et al clearly state is water-soluble or water-dispersible (Col. 3, lines 44-48) and thus is ***hydrophilic***.

Furthermore, depending on the synthetic route used, the resulting polyurethanes cannot be identical in terms of chemical structure, morphology, and film properties. From the attached reference by Backus et al on pp. 290-294 ("Polyurethanes" in

Encyclopedia of Polymer Science and Engineering, Vol. 13, Herman F. Mark et al, Eds., pp. 243-303 (1988)), there are at least 4 different synthetic routes to prepare polyurethane coating. In every route, different reactants are used. In the case of Shoji et al, water-solubilizing groups such as phosphonate, carboxylate, and sulfonate, are incorporated into the polymer backbone to impart the polymer's water dispersibility (Col 4, lines 60-64). Clearly, such hydrophilic polyurethanes cannot be the same as the hydrophobic polyurethanes claimed by the Applicants, which are not water-soluble. To further illustrate the point that not all polyurethanes are the same, on Table 20 of p. 294 of Backus et al's reference, the physical properties of three **different**, aqueous dispersed polyurethanes were compared, and the mechanical property and solvent uptake as measured by % volume swell are substantially different from one polyurethane to another ("Linear dispersion", "Cross-linked dispersion", and "Two-component flexible coating"). Applicants submit that no Information Disclosure Statement is necessary regarding Backus et al, as it is being cited to show the state of the art regarding polyurethanes.

Thus, contrary to the Examiner's assertion, not all polyurethanes are the same. In this connection, the independent claims all recite the hydrophobicity of Applicants' polyurethanes, which clearly distinguishes them from the hydrophilic polyurethanes of Shoji et al. A hydrophobic polyurethane is hardly disclosed or suggested by a hydrophilic polyurethane. "To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)." M.P.E.P. § 2143.03. Accord, M.P.E.P. § 706.02(j). For at least these reasons, the rejection of Claims 1 and 5-7 should be reconsidered and withdrawn.

The addition of Yacobucci et al '858 and Thompson et al fail to cure the defects of Shoji et al, since neither reference discloses nor suggests the use of a two-part reaction to form a hydrophobic polyurethane. It should be noted that Shoji et al specifically require the use of a hydrophilic polyurethane (see, e.g., (Col. 3, lines 44-48), which, they contend, is superior to the prior art of anionic polyurethanes. Thus, Shoji et al present a solution to a problem with prior art one-part polyurethane systems by use of their ***one-part hydrophilic*** polyurethane systems. Such a disclosure, even in combination with Yacobucci et al '858 and Thompson et al, hardly would suggest to one

skilled in the use of Applicants' claimed ***two-part*** system to produce a ***hydrophobic*** polyurethane.

The Examiner's statement that it is well known that polyurethane is formed by reacting isocyanate and polyol sounds suspiciously like the discredited "obvious to try" test. In doing so, the Examiner has ignored the separate problems that Shoji et al and that Applicants were trying to solve. The problem being solved is always germane to the question of obviousness; see, e.g., *Ex parte Wisdom et al.* (POBA 1973) 184 USPQ 822.

Further with regard to Yacobucci et al '858, this reference is also directed to application of a one-component system (here, a polycarbonate-containing polyurethane) to the formed image, such as by immersion of the image recording element in the coating composition, spraying of the image recording element with the coating composition, extrusion of the coating composition onto the element, or otherwise contacting and coating the image coating element with a film of the coating composition (Col. 7, lines 25-53). There is no disclosure or suggestion of *in-situ* formation of the polyurethane from its component reactants directly on the image.

First, Applicants' claim language ("hydrophobic") would appear to exclude "polycarbonate-containing", since this results in a hydrophilic polymer.

Second, there is no disclosure or suggestion that the one-component polyurethanes of Yacobucci et al '858 can be substituted for the hydrophilic polyurethanes of Shoji et al. Even if they could, the arguments relating to Shoji et al above would obtain here.

Reconsideration of the rejection of Claims 1 and 5-7, as amended, under 35 USC 103(a) as being unpatentable over Shoji et al in view of Yacobucci et al '858 and Thompson et al is respectfully requested.

Claims 2-4 are rejected under 35 USC 103(a) as being unpatentable over Shoji et al in view of Yacobucci et al '858 and Thompson et al, *supra*, and further in view of Kurabayashi et al (U.S. Patent 5,985,975).

Shoji et al, Yacobucci et al '858, and Thompson et al are discussed above. Kurabayashi et al disclose a liquid composition, ink set and method and apparatus for image by using the composition and ink set.

The addition of Kurabayashi et al adds nothing to the combination of the three references in overcoming the defects of Shoji et al discussed above. Thus, Claims 2-4 are patentable for at least the reasons that Claims 1 and 5-7 are patentable.

Reconsideration of the rejection of Claims 2-4 under 35 USC 103(a) as being unpatentable over Shoji et al in view of Yacobucci et al '858 and Thompson et al, and further in view of Kurabayashi et al is respectfully requested.

Claims 1, 5-8, 12-16, and 20-22 are rejected under 35 USC 103(a) as being unpatentable over Shoji et al in view of Yacobucci et al '858 and Thompson et al, *supra*.

The three references have been discussed above.

The arguments made above obtain here as well. Further, the Examiner has provided no motivation as to why one skilled in the art would modify the teachings of Shoji et al, which purportedly successfully jets a ***hydrophilic one-part*** polyurethane through an ink jet print head, to come up with Applicants' ***hydrophobic*** polyurethane via a ***two-part*** reaction system. Certainly, Shoji et al fails to teach this, and the remaining references cited by the Examiner add nothing to the teachings of Shoji et al, contrary to the Examiner's assertion. Indeed, Applicants can find no disclosure or suggestion by Yacobucci et al '858 or Thompson et al that would suggest so modifying the teachings of Shoji et al.

Further, with specific regard to Claims 8 and 12-15, none of the references, even combined, disclose or suggest the steps of:

providing a first container containing at least one first component comprising at least one iso-cyanate monomer or oligomer, optionally in a vehicle;

providing a second container containing at least one second component comprising at least one polyol, plus at least one base catalyst, optionally in a vehicle;

in either order, depositing the at least one first reactive component and the at least one second component on the printed ink-jet ink; and

allowing reaction to proceed between the at least one first reactive component and the at least one second reactive component on the print media to form a ***hydrophobic*** polymer.

At best, the combination of references of Shoji et al, Kurabayashi et al, and Yacobucci et al discloses depositing ***preformed hydrophilic*** polyurethane itself on the

print media, without any disclosure or suggestion of reacting *in-situ* the two components that make up polyurethane.

Finally, none of the cited references discloses or suggests printing the two components through separate printheads, as recited in Claim 15.

Reconsideration of the rejection of Claims 1, 5-8, 12-16, and 20-22, as amended, under 35 USC 103(a) as being unpatentable over Shoji et al in view of Yacobucci et al '858 and Thompson et al is respectfully requested.

Claims 2-4, 9-11, and 17-19 are rejected under 35 USC 103(a) as being unpatentable over Shoji et al in view of Yacobucci et al '858 and Thompson et al, *supra*, and further in view of Kurabayashi et al, *supra*.

The four references are discussed above.

This rejection has been argued above with respect to Claims 2-4, and the arguments made above obtain here as well.

Reconsideration of the rejection of Claims 2-4, 9-11, and 17-19 under 35 USC 103(a) as being unpatentable over Shoji et al in view of Yacobucci et al '858 and Thompson et al, *supra*, and further in view of Kurabayashi et al is respectfully requested.

Claims 1 and 5-7 are rejected under 35 USC 103(a) as being unpatentable over Yacobucci et al (U.S. Patent 6,312,858) in view of Yacobucci et al (U.S. Patent 6,268,101).

The Yacobucci et al '858 reference is discussed above. Yacobucci et al '101 disclose a water-resistant polyurethane overcoat for imaging materials. The protective overcoat purportedly resists fingerprints, common stains, and spills. The reference discloses a water permeable overcoat during image formation but that is water resistant in the final processed product. The overcoat, before formation of the image, comprises polyurethane particles in a gelatin-containing matrix. Subsequent to formation of the image, the overcoat is heat fused, resulting in the formation of a water-resistant continuous protective overcoat that purportedly provides excellent scratch and spill resistance.

The Examiner essentially argues that Yacobucci et al '858 teaches the elements of Applicants' claimed invention, but for the two-component requirement, and raises the same arguments as with Shoji et al, *supra*. The arguments presented above with regard to Shoji et al obtain here as well.

Yacobucci et al '101 add nothing in combination with Yacobucci et al '858, and, indeed, require forming the polyurethane in gelatin and subsequently heat fusing the mixture, both of which would appear to be excluded by the language of Applicants' claims.

In direct contrast, Applicants' two-component hydrophobic polyurethane, formed by reaction of at least one iso-cyanate monomer or oligomer, and at least one polyol, provides a water-resistant coating upon polymerization at ambient condition, and does not require a separate heat-fusing step, a step required by Yacobucci et al '101 and Thompson et al '856. Furthermore, the required condition to remove the protecting groups is at about 175° to 220°C as described by Thompson et al '856 (Col. 7, lines 23-25). This is a condition that can readily damage the substrate.

Reconsideration of the rejection of Claims 1 and 5-7, as amended, under 35 US under 35 USC 103(a) as being unpatentable over Yacobucci et al '858 in view of Yacobucci et al '101 is respectfully requested.

Claims 2-4 are rejected under 35 USC 103(a) as being unpatentable over Yacobucci et al '858 in view of Yacobucci et al '101, *supra*, and further in view of Kurabayashi et al, *supra*.

The three references are discussed above. Claims 2-4 are patentable for at least the same reasons as given in response to the rejection of these claims over Shoji et al in view of Yacobucci et al '858 and Thompson et al, *supra*, and further in view of Kurabayashi et al, in light of the discussion above regarding the combination of Yacobucci et al '858 and Yacobucci et al '101.

Reconsideration of the rejection of Claims 2-4 under 35 USC 103(a) as being unpatentable over Yacobucci et al '858 in view of Yacobucci et al '101 and further in view of Kurabayashi et al is respectfully requested.

Claims 1, 5-8, 12-14, 16, and 20-22 are rejected under 35 USC 103(a) as being unpatentable over Yacobucci et al '858 in view of Yacobucci et al '101, *supra*, and further in view of Thompson et al, *supra*.

The three references are discussed above. Claims 1, 5-8, 12-14, 16, and 20-22 are patentable for at least the same reasons as given in response to the rejection of these claims over Shoji et al in view of Yacobucci et al '858 and Thompson et al, *su-*

pra, in light of the discussion above regarding the combination of Yacobucci et al '858 and Yacobucci et al '101.

Reconsideration of the rejection of Claims 1, 5-8, 12-14, 16, and 20-22, as amended, under 35 USC 103(a) as being unpatentable over Yacobucci et al '858 in view of Yacobucci et al '101 and further in view of Thompson et al is respectfully requested.

Claims 2-4, 9-11, and 17-19 are rejected under 35 USC 103(a) as being unpatentable over Yacobucci et al '858 in view of Yacobucci et al '101, *supra*, and further in view of Thompson et al, *supra*, and further in view of Kurabayashi et al, *supra*.

The four references are discussed above. Claims 2-4, 9-11, and 17-19 are patentable for at least the same reasons as given in response to the rejection of these claims over Shoji et al in view of Yacobucci et al '858 and Thompson et al, *supra*, and further in view of Kurabayashi et al, in light of the discussion above regarding the combination of Yacobucci et al '858 and Yacobucci et al '101.

Reconsideration of the rejection of Claims 2-4, 9-11, and 17-19 under 35 USC 103(a) as being unpatentable over Yacobucci et al '858 in view of Yacobucci et al '101, and further in view of Thompson et al, and further in view of Kurabayashi et al is respectfully requested.

The Examiner cites Inamoto et al (U.S. Patent 6,000,793 as being pertinent to Applicants' disclosure. Applicants have reviewed this reference and consider that it neither discloses nor suggests their claimed invention, whether taken alone or in any reasonable combination with the above-discussed references.

The foregoing amendments and arguments are submitted to place the application in condition for allowance. The Examiner is respectfully requested to take such action. If the Examiner has any questions, he is invited to contact the undersigned at the below-listed telephone number. HOWEVER, ALL WRITTEN COMMUNICATIONS SHOULD CONTINUE TO BE DIRECTED TO: IP ADMINISTRATION, LEGAL DEPARTMENT, M/S 35, HEWLETT-PACKARD COMPANY, P.O. BOX 272400, FORT COLLINS, CO 80527-2400.

Respectfully submitted,

December 21, 2006

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